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EXAMINER	
LE, DUY K	

ART UNIT	PAPER NUMBER
2685	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/068,120	WIGHT, JAMES STUART	
	Examiner	Art Unit	
	Duy K Le	2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☒ Claim(s) *10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3, 6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 10 is objected to because of the following informalities: claim 10 is stated as "a method according to claim 3", but claim 3 is for a combiner. It seems that claim 10 should be stated as –a method according to claim 9–. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Dent (U.S. Patent 5,361,404).

As to claim 1, Figure 2 in Dent shows a combiner for combining a plurality of received diversity signals in a radio receiver and producing therefrom a combined output signal, said combiner comprising a gain control engine (50) configured for determining the strength of each said received signal and said combined output signal and for controlling a gain controller on the basis of the results of said determinations, whereby said gain controller inverts a weakest one of said received signals for combination with the other said received signals when such inversion increases the strength of said combined output signal ("in more complicated situations, the control unit 50 determines to what extent the amplified output from both of the amplifiers 38 and 40 should influence the combined output from combining means 41 in order to obtain optimal

signal quality. The control unit 50 tests for optimal signal quality using a number of criteria. While any number and/or type of criteria may be used, the simplest quantity for the control unit 50 to test quickly is the signal strength" (Col. 3, lines 52-61). "The control unit 50 can activate the phase inverter 58 to invert the phase in one signal path to achieve constructive signal addition. In addition, a phase inverter 58 may be included in more than one signal path so that plural and alternative phase shifts may be selected by the control unit 50. Similarly, instead of phase inverters, variable phase shifters may be used to more accurately compensate for phase differences in the different signal paths" (Col. 4, lines 17-25). "After the control unit 50 sequentially tests each of the various test conditions, the control unit 50 determines which of the conditions resulted in the optimal signal quality of the output signal 60" (Col. 5, lines 19-22). "A table may be stored of demodulated signal quality (i.e., bit errors in a given data burst) versus the measured signal strength for each of the signal paths alone and for the sum (phase inverter disabled) and difference (phase inverter enabled) of the signal paths" (Col. 5, lines 29-34). See also Figures 3(a) & 3(b)).

As to claim 2, the Dent reference discloses a combiner according to claim 1 wherein said gain control engine makes a first determination of the strength of said combined output signal before said weakest received signal is inverted and a second determination of the strength of said combined output signal after said weakest received signal has been inverted, and wherein said inversion of said weakest received signal is continued when said strength of said second determination increases over that of said first determination and is reversed when said strength of said second determination decreases over that of said first determination ("after the control unit 50 sequentially tests each of the various test conditions, the control unit 50 determines which of

the conditions resulted in the optimal signal quality of the output signal 60" (Col. 5, lines 19-22). "A table may be stored of demodulated signal quality (i.e., bit errors in a given data burst) versus the measured signal strength for each of the signal paths alone and for the sum (phase inverter disabled) and difference (phase inverter enabled) of the signal paths" (Col. 5, lines 29-34). "Using the tables, newly measured signal strengths may be translated into an expected number of bit errors with the signal path for which the fewest bit errors is expected then being selected. If actual use of that signal path results in a higher than expected number of bit errors, the statistical tables are then updated to give more correct estimates of the expected number of errors, possibly resulting in the previously selected signal path now being de-selected" (Col. 5, lines 39-47)).

As to claim 3, the Dent reference discloses a combiner according to claim 2 wherein said first and second determinations and inverting of said weaker signal are repeated either periodically or upon the occurrence of a reduction of said strength of said combined output signal by a predetermined amount ("using the tables, newly measured signal strengths may be translated into an expected number of bit errors with the signal path for which the fewest bit errors is expected then being selected. If actual use of that signal path results in a higher than expected number of bit errors, the statistical tables are then updated to give more correct estimates of the expected number of errors, possibly resulting in the previously selected signal path now being de-selected" (Col. 5, lines 39-47)).

As to claim 7, Figures 2, 3(a, and 3(b) disclose a method for combining a plurality of received diversity signals in a radio receiver and producing therefrom a combined output signal, said method comprising determining the strength of each said received signal and said combined output signal and controlling the gain of said received signals on the basis of the results of said

determinations, whereby a weakest one of said received signals is inverted for combination with the other said received signals when such inversion increases the strength of said combined output signal ("in more complicated situations, the control unit 50 determines to what extent the amplified output from both of the amplifiers 38 and 40 should influence the combined output from combining means 41 in order to obtain optimal signal quality. The control unit 50 tests for optimal signal quality using a number of criteria. While any number and/or type of criteria may be used, the simplest quantity for the control unit 50 to test quickly is the signal strength" (Col. 3, lines 52-61). "The control unit 50 can activate the phase inverter 58 to invert the phase in one signal path to achieve constructive signal addition. In addition, a phase inverter 58 may be included in more than one signal path so that plural and alternative phase shifts may be selected by the control unit 50. Similarly, instead of phase inverters, variable phase shifters may be used to more accurately compensate for phase differences in the different signal paths" (Col. 4, lines 17-25). "After the control unit 50 sequentially tests each of the various test conditions, the control unit 50 determines which of the conditions resulted in the optimal signal quality of the output signal 60" (Col. 5, lines 19-22). "A table may be stored of demodulated signal quality (i.e., bit errors in a given data burst) versus the measured signal strength for each of the signal paths alone and for the sum (phase inverter disabled) and difference (phase inverter enabled) of the signal paths" (Col. 5, lines 29-34)).

As to claim 8, the Dent reference discloses a method according to claim 7 including making a first determination of the strength of said combined output signal before said weakest received signal is inverted and a second determination of the strength of said combined output signal after said weakest received signal has been inverted, and continuing said inversion of said

weakest received signal when said strength of said second determination increases over that of said first determination and reversing said inversion of said weakest received signal when said strength of said second determination decreases over that of said first determination ("after the control unit 50 sequentially tests each of the various test conditions, the control unit 50 determines which of the conditions resulted in the optimal signal quality of the output signal 60" (Col. 5, lines 19-22). "A table may be stored of demodulated signal quality (i.e., bit errors in a given data burst) versus the measured signal strength for each of the signal paths alone and for the sum (phase inverter disabled) and difference (phase inverter enabled) of the signal paths" (Col. 5, lines 29-34). "Using the tables, newly measured signal strengths may be translated into an expected number of bit errors with the signal path for which the fewest bit errors is expected then being selected. If actual use of that signal path results in a higher than expected number of bit errors, the statistical tables are then updated to give more correct estimates of the expected number of errors, possibly resulting in the previously selected signal path now being de-selected" (Col. 5, lines 39-47)).

As to claim 9, the Dent reference discloses a method according to claim 8 whereby said first and second determinations and inverting of said weaker signal are repeated either periodically or upon the occurrence of a reduction of said strength of said combined output signal by a predetermined amount ("using the tables, newly measured signal strengths may be translated into an expected number of bit errors with the signal path for which the fewest bit errors is expected then being selected. If actual use of that signal path results in a higher than expected number of bit errors, the statistical tables are then updated to give more correct

estimates of the expected number of errors, possibly resulting in the previously selected signal path now being de-selected" (Col. 5, lines 39-47)).

As to claim 10. A method according to –claim 9– including determining the noise in received signal channels and controlling said gain also on the basis of said signal-to-noise ratios determined for said received signals whereby each said received signal is amplified by a gain proportional to said signal-to-noise ratio determined therefor.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 4-6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,361,404 to Dent in view of Deerkoski (U.S. Patent 3,737,781).

As to claims 4 and 10, the Dent reference discloses a combiner according to claim 3 and a method according to –claim 9–. However, it does not disclose the gain control engine is configured for determining the noise in received signal channels and said controlling of said gain controller is based also on signal-to-noise ratios determined for said received signals whereby each said received signal is amplified by a gain proportional to said signal-to-noise ratio determined therefor. The Deerkoski reference teaches the gain control engine is configured for determining the noise in received signal channels and said controlling of said gain controller is based also on signal-to-noise ratios determined for said received signals whereby each said

received signal is amplified by a gain proportional to said signal-to-noise ratio determined therefor ("a multi-channel diversity receiver according to this invention would preferably use one SNR determination circuit in conjunction with the AGC level for each channel enables the weighting process for each channel independent of all other channels. Subsequent to weighting, the output from each channel is summed in the combiner (9)" Col. 5, lines 3-10)).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combiner and method of Dent wherein the gain control engine is configured for determining the noise in received signal channels and said controlling of said gain controller is based also on signal-to-noise ratios determined for said received signals whereby each said received signal is amplified by a gain proportional to said signal-to-noise ratio determined therefor, as taught by Deerkoski, in order to optimize diversity receiver performance by improvement of output SNR.

As to claim 5, Dent-Deerkoski discloses a combiner according to claim 4 wherein said gain controller comprises an automatic gain controller (AGC) for each said received signal (Dent; "different combinations of the variable gains G_1 and G_2 applied to the amplifiers 38 and 40, respectively, may be achieved over the adaptive gain control lines 52 and 54. In the function block 84, the adaptive gain values represented by gains G_1 and G_2 are applied to the signals S1 and 2, respectively" (Col. 4, lines 61-66). Deerkoski; "a multi-channel diversity receiver according to this invention would preferably use one SNR determination circuit in conjunction with the AGC level for each channel enables the weighting process for each channel independent of all other channels. Subsequent to weighting, the output from each channel is summed in the combiner (9)" Col. 5, lines 3-10)).

As to claim 6, Dent-Deerkoski discloses a combiner according to claim 5 wherein said gain control engine comprises a digital signal processor (Dent; "in a preferred embodiment of the present invention, the control unit 50 is a conventional microprocessor" (Col. 3, lines 47-48)).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Strolle (U.S. Patent 6,154,503) discloses automatic gain control system that responds to baseband signal distortion.

b. Sano (U.S. Patent 5,697,083) discloses diversity receiver.

c. Pallonen (U.S. Patent 6,408,169) discloses method and system for selecting an antenna beam of a base station of a radio system.

d. Conner et al. (U.S. Patent 6,256,484) discloses diversity reception system.

e. Shimizu et al. (U.S. Patent 6,088,583) discloses automatic gain control circuit.

f. Tagliaferri (U.S. Patent 3,965,422) discloses system channel distortion weighting for predetection combiners.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duy K Le whose telephone number is 703-305-5660. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F Urban can be reached on 703-305-4385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Duy Le
May 21, 2004

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